

**DENSO**

**Diesel Injection Pump**

# **SERVICE MANUAL**

**OPEL Z17DT\* TYPE ENGINE  
COMMON RAIL SYSTEM (CRS)  
OPERATION**

**January, 2007**

**DENSO CORPORATION**

00400588E

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# 1. PRODUCT APPLICATION INFORMATION

## 1.1 Outline

- The Common Rail System (CRS) used with the OPEL Z17DT\* engine has been redesigned. Basic system configuration is identical to that of the CRS used with the OPEL 4EE2 engine. This service manual only addresses changes/additions from the CRS used with the 4EE2 engine. For details on other parts, refer to the service manual entitled, "Common Rail System for OPEL 4EE2 Type Engine" (Doc ID: 00400028).

## 1.2 Application

Model Year	Vehicle Name	Engine Model	Engine Displacement	Reference
2007 MY	Corsa	Z17DT*	1.7L	Made in Europe
	Meriva			

## 1.3 System Component Part Numbers

- The EGR valve has been changed from a DENSO product to that of another manufacturer.

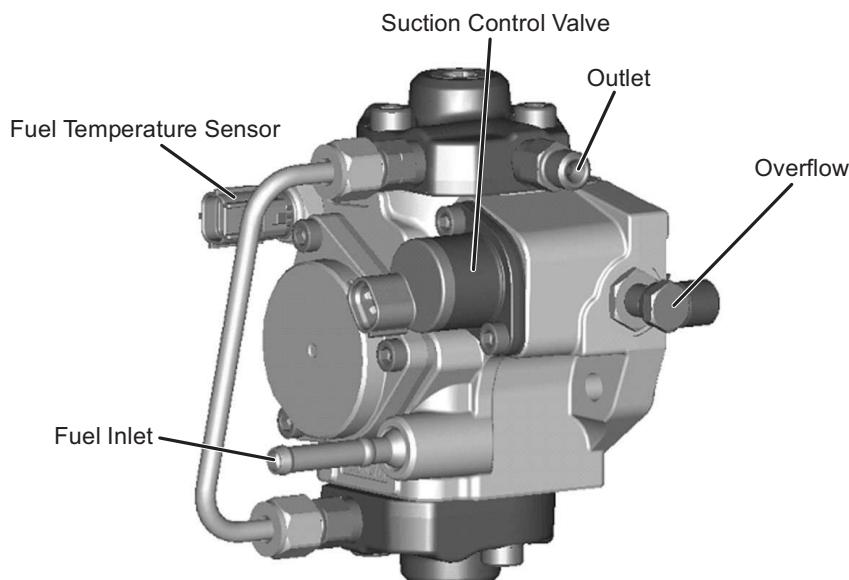
Part Name	Vehicle Model		DENSO Part Number	Car Manufacturer Part Number
	Corsa	Meriva		
Supply Pump	Yes	Yes	HU294000-050#	97376269
Rail	Yes	Yes	HU095440-090#	97376271
Injector	Yes	Yes	HU095000-613#	97376270
Engine ECU	DTR	Yes	MB275800-467#	98000820
		No	MB275800-475#	98002896
	DT	No	MB275800-476#	98025828
Crankshaft Position Sensor	Yes	Yes	949979-120#	97321620
Cylinder Recognition Sensor	Yes	Yes	949979-120#	97321620
Boost Pressure Sensor	Yes	Yes	079800-783#	97381191

## 2. SUPPLY PUMP

### 2.1 Outline

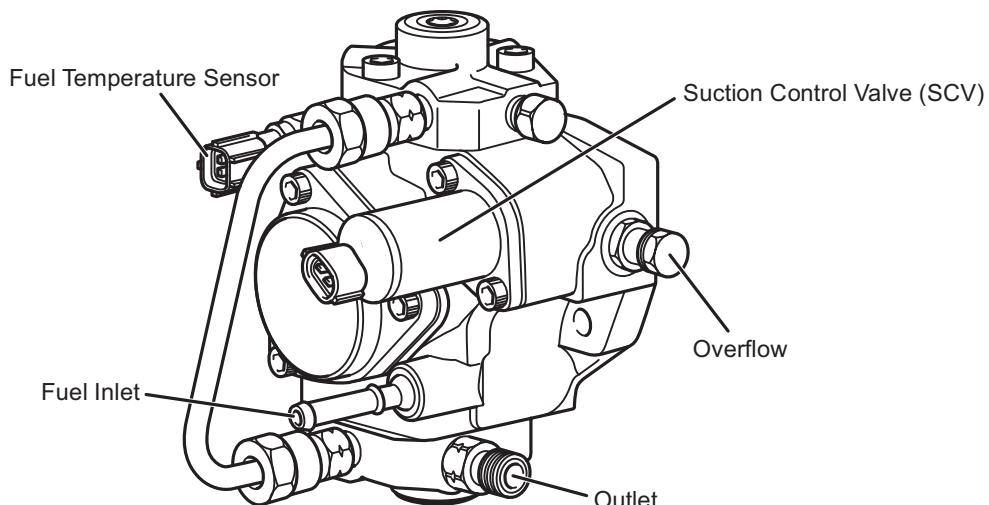
- This HP3 supply pump is equipped with a compact Suction Control Valve (SCV). Parts other than the SCV have not changed. For details, refer to the service manual entitled, "Common Rail System for OPEL 4EE2 Type Engine" (Doc ID: 00400028).

**New Model**



Q002036E

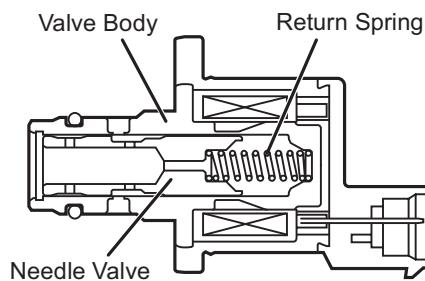
**Old Model**



Q002061E

## 2.2 Suction Control Valve (SCV)

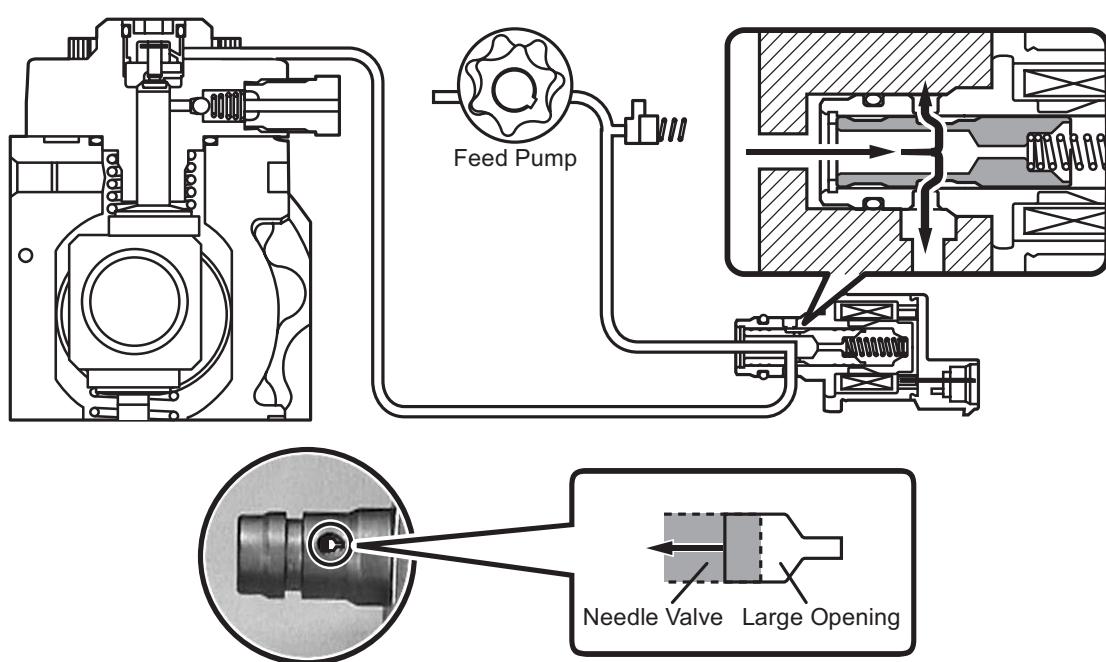
- A linear solenoid type valve has been adopted. The ECU controls the duty ratio (the length of time that the current is applied to the SCV), in order to control the quantity of fuel that is supplied to the high-pressure plunger.
- Because only the quantity of fuel that is required for achieving the target rail pressure is drawn in, the drive load of the supply pump decreases.
- When current flows to the SCV, variable electromotive force is created in accordance with the duty ratio, moving the armature to the left side. The armature moves the cylinder to the left side, changing the opening of the fuel passage and thus regulating the fuel quantity.
- With the SCV OFF, the return spring contracts, completely opening the fuel passage and supplying fuel to the plungers. (Full quantity intake and full quantity discharge)
- When the SCV is ON, the force of the return spring moves the cylinder to the right, closing the fuel passage (normally opened).
- By turning the SCV ON/OFF, fuel is supplied in an amount corresponding to the actuation duty ratio, and fuel is discharged by the plungers.



Q002045E

### (1) Short duty ON duration

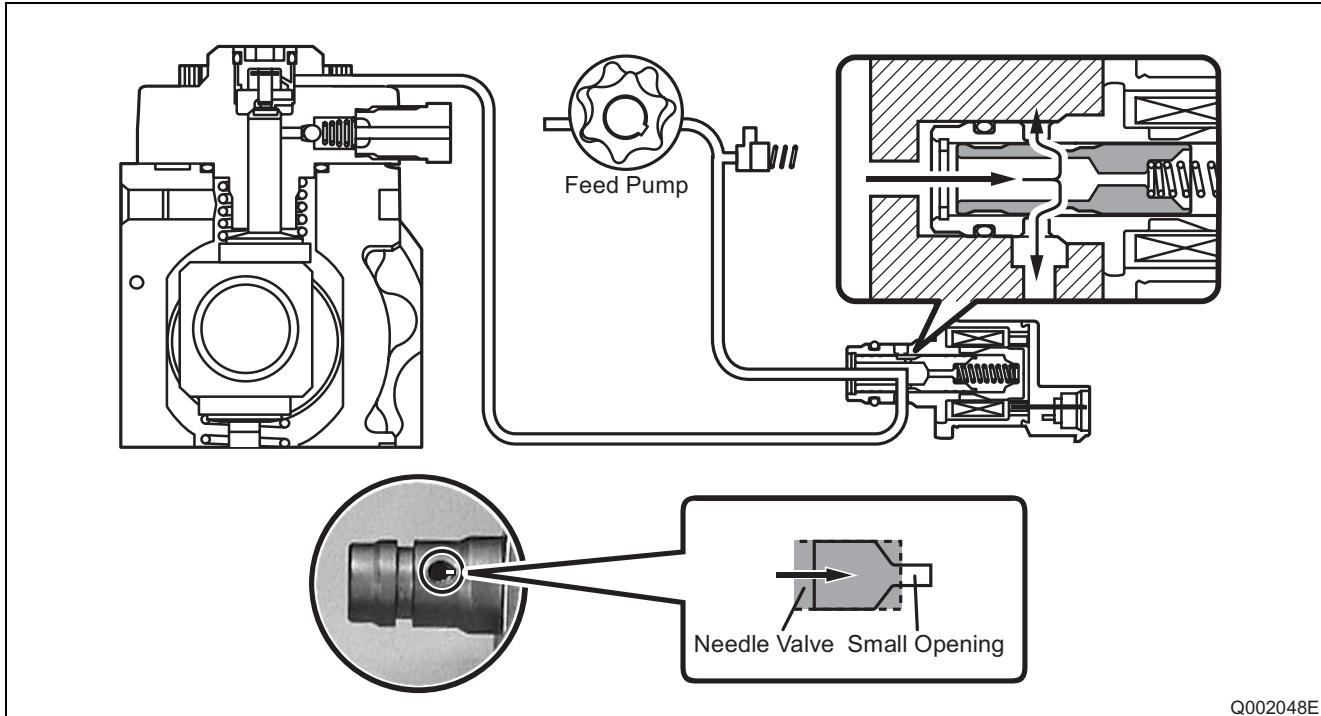
- Short duty ON duration => large valve opening => maximum intake quantity



Q002047E

## (2) Long duty ON duration

- Long duty ON duration => small valve opening => minimum intake quantity



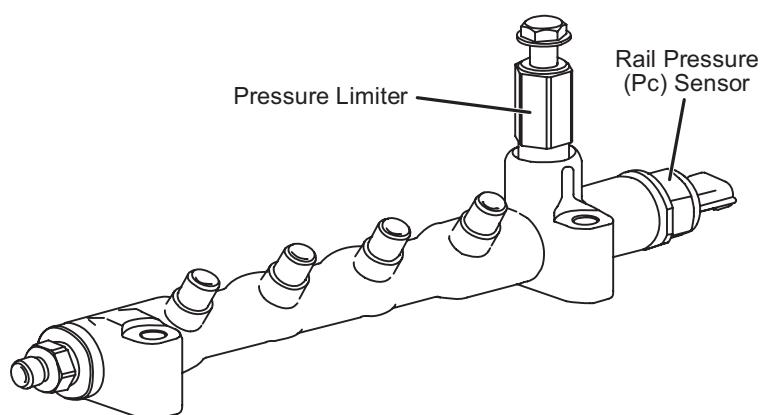
Q002048E

## 3. RAIL

### 3.1 Outline

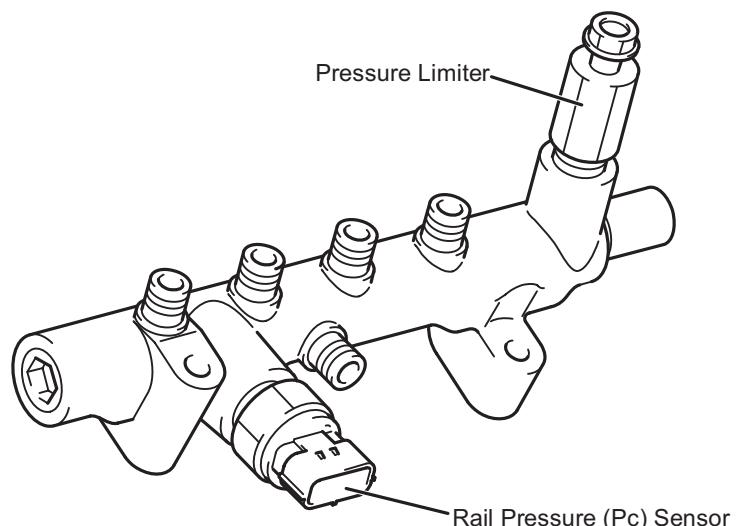
- The shape of the rail as well as the installation positions for the fuel pressure sensor and pressure limiter have been changed. The shape and characteristics of the rail pressure sensor and pressure limiter have not changed. For details, refer to the service manual entitled, "Common Rail System for OPEL 4EE2 Type Engine" (Doc ID: 00400028).

New Model



Q002037E

Old Model

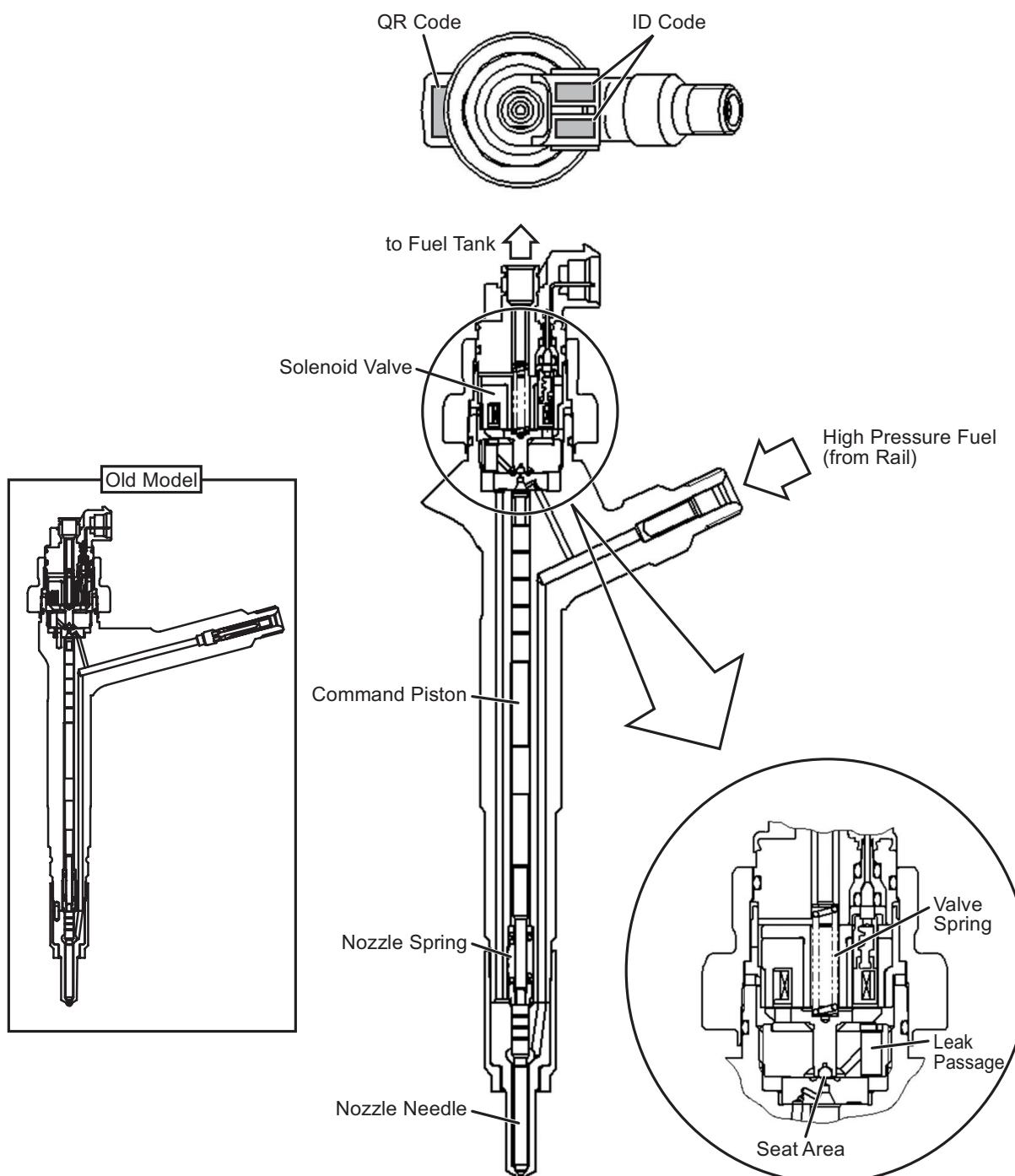


Q002049E

## 4. INJECTOR

### 4.1 Outline

- The shape of the injector as well as the QR code (ID code) correction point have been changed. Other specifications and operations have not changed. For details, refer to the service manual entitled, "Common Rail System for OPEL 4EE2 Type Engine" (Doc ID: 00400028).

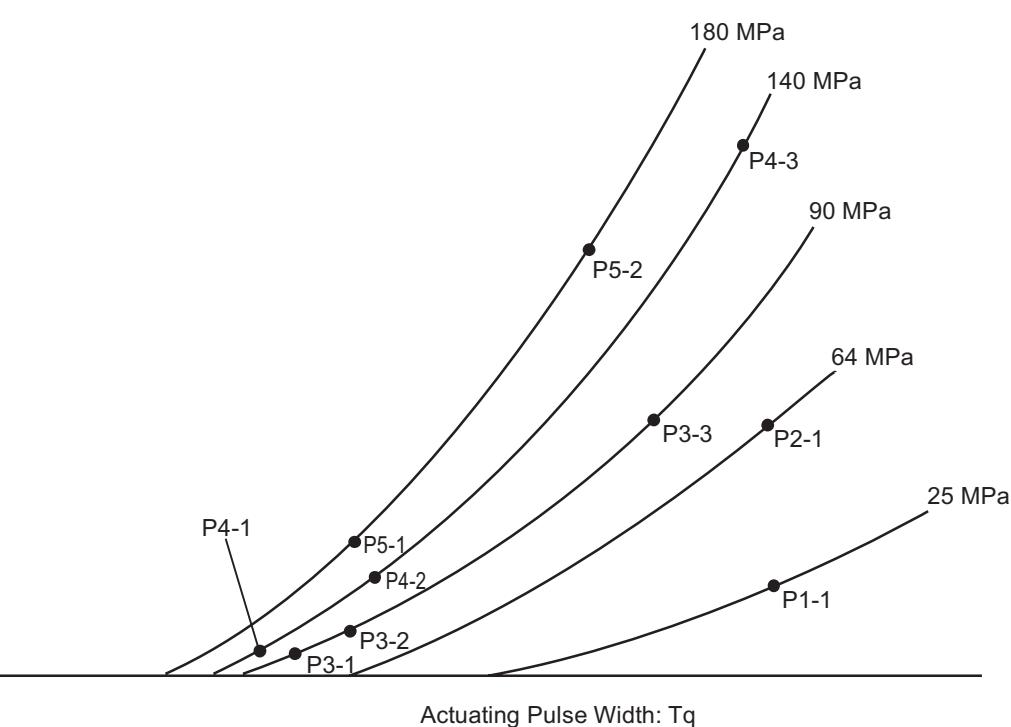


## 4.2 QR Code

- QR code correction points are as per the figure below.

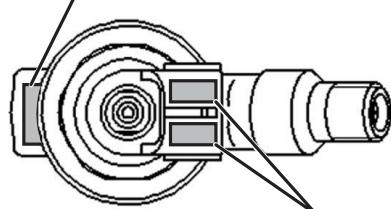
**QR Code Correction Point**

Injection  
Quantity: Q



Actuating Pulse Width: Tq

QR Code (□ 9.9 mm)



ID Code  
(22 sets of 16 alphanumeric figures)

Contents of Printing

TP <sub>1-1</sub>	TP <sub>2-1</sub>	TP <sub>3-1</sub>
TP <sub>3-2</sub>	TP <sub>3-3</sub>	TP <sub>4-1</sub>
TP <sub>4-2</sub>	TP <sub>4-3</sub>	TP <sub>5-1</sub>
TP <sub>5-2</sub>	BCC	

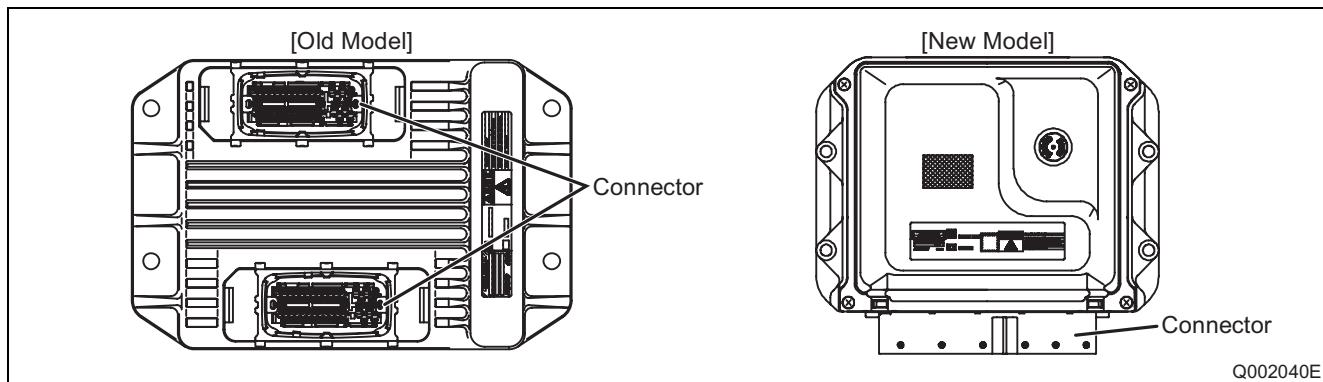
## 5. CONTROL SYSTEM COMPONENTS DESCRIPTION

### 5.1 Outline

- Changes/additions to control-related parts are explained herein. For details on other parts, refer to the service manual entitled, "Common Rail System for OPEL 4EE2 Type Engine" (Doc ID: 00400028).

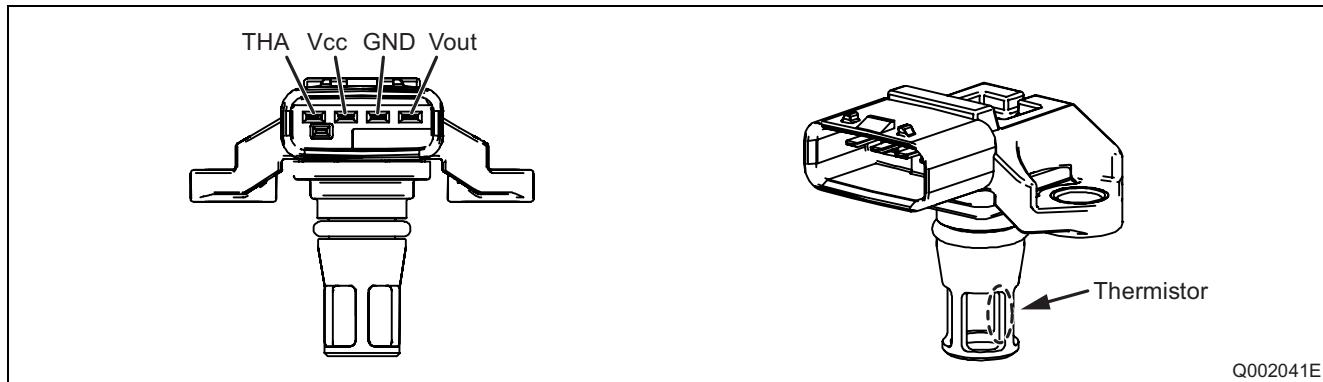
### 5.2 Engine ECU

- The shape of the engine ECU has been changed. As a result, the shape of the connector has also been changed. For details on the connector, refer to "7. EXTERNAL WIRING DIAGRAM".



### 5.3 Boost Pressure Sensor

- The boost pressure sensor detects intake air pressure. The boost pressure sensor also includes a thermistor-type temperature sensor.



## 6. DIAGNOSIS

### 6.1 Diagnostic Trouble Code (DTC) Table

- Read symptom codes using the manufacturer's diagnostic tool.

#### (1) For Corsa

DTC	Failure Part	Symptom	Failure Mode
P0100	Mass airflow sensor	27	Mass airflow sensor signal too high
		26	Mass airflow sensor signal too low
		52	Mass airflow sensor performance invalid
P0095	Intake air temperature sensor	07	Intake air temperature sensor signal too high
		03	Intake air temperature sensor signal too low
P0115	Coolant temperature sensor	07	Coolant temperature sensor signal too high
		03	Coolant temperature sensor signal too low
		52	Coolant temperature sensor performance invalid
P1120	Accelerator position sensor 1	07	Accelerator position sensor 1 signal too high
		03	Accelerator position sensor 1 signal too low
P1122	Accelerator position sensor 2	07	Accelerator position sensor 2 signal too high
		03	Accelerator position sensor 2 signal too low
P1120	Accelerator position sensor	52	Accelerator position sensor signal performance invalid
P0235	Boost pressure sensor	07	Boost pressure sensor signal too high
		03	Boost pressure sensor signal too low
		52	Boost pressure sensor performance invalid
P0180	Fuel temperature sensor	07	Fuel temperature sensor signal too high
		03	Fuel temperature sensor signal too low
P0190	Rail pressure sensor	07	Rail pressure sensor signal too high
		03	Rail pressure sensor signal too low
		52	Rail pressure sensor signal keeping the middle range
P0409	EGR lift (position) sensor	07	EGR lift (position) sensor signal too high
		03	EGR lift (position) sensor signal too low
P2226	Atmospheric pressure sensor	07	Atmospheric pressure sensor signal too high
		03	Atmospheric pressure sensor signal too low
P0110	Intake air temperature frequency sensor	27	Intake air temperature frequency sensor frequency too long
		26	Intake air temperature frequency sensor frequency too short
	Intake air temperature analog sensor	01	Intake air temperature analog sensor signal too high
		02	Intake air temperature analog sensor signal too low

DTC	Failure Part	Symptom	Failure Mode
P0530	A/C pressure sensor	07	A/C pressure sensor signal too high
		03	A/C pressure sensor signal too low
		57	A/C pressure sensor GND signal open
P0571	Brake switch	08	Brake switch diagnostics; Cruise control brake switch no signal
P0168	Fuel injection quantity reduction	5B	Fuel quantity reduction by injector leak temperature
P0704	Clutch switch	08	Clutch switch circuit malfunction (manual transmission only)
P0520	Oil pressure switch	05	Oil pressure switch stuck open
P0335	Crankshaft position sensor	04	Crankshaft position sensor no pulse
		08	Crankshaft position sensor signal invalid
P0340	Cylinder recognition sensor	04	Cylinder recognition sensor no pulse
		08	Cylinder recognition sensor signal invalid
P0016	Crankshaft position sensor / Cylinder recognition sensor	08	Crankshaft position sensor/cylinder recognition sensor signal synchronization error
P0685	Main relay	02	Main relay diagnostics; Main relay stuck closed
P1625		62	Main relay diagnostics; Main relay stuck open/relay output open load
P0641	Sensor reference voltage 1	07	Sensor reference voltage output No.1 too high
		03	Sensor reference voltage output No.1 too low
P0651	Sensor reference voltage 2	07	Sensor reference voltage output No.2 too high
		03	Sensor reference voltage output No.2 too low
P0380	Glow system	01	Glow controller command line short to battery; Glow controller internal malfunction
		06	Glow controller command line open load/short to GND; Glow controller internal malfunction
		02	Glow plug R side short; Glow diagnosis line short to GND; Glow controller internal malfunction
		04	Glow plug R side open load; Glow diagnosis line open load; Glow controller internal malfunction
P0685	Main relay	01	Main relay/relay output short to battery
P1625		63	Main relay/relay output short to GND
P0645	A/C relay output	01	A/C relay output short to battery
		06	A/C relay output open load/short to GND
P0403	EGR control DC motor	08	EGR control DC motor output 1 short to battery/short to GND output 2 short to battery/short to GND motor short
		04	EGR control DC motor output 1 open load output 2 open load motor open load

DTC	Failure Part	Symptom	Failure Mode
P0201	Injector drive	61	TWV1 output open load; Injector #1 coil open
P0203		61	TWV2 output open load; injector #3 coil open
P0204		61	TWV3 output open load; injector #4 coil open
P0202		61	TWV4 output open load; injector #2 coil open
P2146		01	COM1 output short to battery; TWV 1 or 3 output short to battery, both TWV 1 and TWV 3 open load
		02	COM 1 output short to GND; TWV 1 or 3 output short to GND
P2149		01	COM1 output short to battery; TWV 2 or 4 output short to battery, both TWV 2 and TWV 4 open load
		02	COM 2 output short to GND; TWV 2 or 4 output short to GND
P0606		58	Capacitor charge-up circuit malfunction (insufficient charge)
P0602	QR code failure	48	QR code not programmed
P062F		33	QR code error
		36	QR correction information is abnormal
P0093	Common rail system	66	Pressure limiter activated
P0088		52	Supply pump protection
P0087		68	Supply pump exchange
		66	Supply pump malfunction (insufficient flow)
P0001	Suction control valve (SCV)	01	SCV (+) output short to battery; SCV (-) output short to battery
		06	SCV (+) output open load/short to GND; SCV (-) output open load/short to GND; SCV coil open; SCV coil short
	SCV valve	61	SCV stuck
P0094	Common rail system	66	Rail pressure sensor performance invalid included fuel leak
P0088		5B	Rail pressure exceeds upper limit
P0217	Engine overheat	5B	Engine overheat
P0219	Engine overrun	5B	Engine overrun
P0601	Engine ECU internal failure	4A	Check sum error - flash area
P0606		37	CPU fault; -Main CPU fault
		38	CPU fault; -Watchdog IC fault
P0301	Injector 1	04	Cylinder 1 fuel system failure
P0302	Injector 2	04	Cylinder 2 fuel system failure
P0303	Injector 3	04	Cylinder 3 fuel system failure
P0304	Injector 4	04	Cylinder 4 fuel system failure

DTC	Failure Part	Symptom	Failure Mode
P0400	EGR system	5B	EGR excessive flow (EGR positive deviation)
		63	EGR insufficient flow (EGR negative deviation)
	EGR valve	61	EGR valve open/close stuck
P0299	Turbo system	52	Turbo control system (negative deviation)
P0234		52	Turbo control system (positive deviation)
P0243	Electric Vacuum Regulating Valve (EVRV); Turbo	01	EVRV; Turbo output short to battery
		06	EVRV; Turbo output open load/short to GND
P0660	Variable swirl control (VSS) output (VSV)	01	VSS output (VSV) short to battery
		06	VSS output (VSV) open load/short to GND
P0638	Diesel throttle system	01	Diesel throttle controller output signal short to battery
		06	Diesel throttle controller output signal open load/short to GND
		08	Diesel throttle controller failure status
P0425	Upper Oxygen catalyst temperature sensor (exhaust gas temperature 1)	07	Upper oxygen catalyst temperature sensor (exhaust gas temperature 1) voltage too high
		03	Upper oxygen catalyst temperature sensor (exhaust gas temperature 1) voltage too low
		54	Upper oxygen catalyst temperature sensor (exhaust gas temperature 1) temperature too high
P042A	Upper DPF temperature sensor (exhaust gas temperature 2)	07	Upper DPF temperature sensor (exhaust gas temperature 2) voltage too high
		03	Upper DPF temperature sensor (exhaust gas temperature 2) voltage too low
		54	Upper DPF temperature sensor (exhaust gas temperature 2) temperature too high
P2452	Differential pressure sensor	07	Voltage too high
		03	Voltage too low
		5B	Differential pressure too high
		61	Hose line disconnect upstream
P0480	Fan relay 1 output	01	Fan control relay 1 short to battery
		06	Fan control relay 1 open load/short to GND
P0481	Fan relay 2 output	01	Fan control relay 2 short to battery
		06	Fan control relay 2 open load/short to GND
P0482	Fan relay 3 output	01	Fan control relay 3 short to battery
		06	Fan control relay 3 open load/short to GND
P0100	Mass airflow sensor	28	Mass airflow sensor too low
P242F	DPF system	66	DPF over loaded
		5B	DPF over loaded 2
		57	Not ended regeneration
		52	Differential pressure sensor characteristic abnormality
P2002			
P2452			

DTC	Failure Part	Symptom	Failure Mode	
P0425	Upper Oxygen catalyst temperature sensor (Exhaust gas temperature 1)	52	Upper oxygen catalyst temperature sensor (exhaust gas temperature 1) sensor characteristic abnormality	
P042A	Upper DPF temperature sensor (exhaust gas temperature 2)	52	Upper DPF temperature sensor (exhaust gas temperature 2) characteristic abnormality	
P2425	EGR cooler bypass	01	EGR cooler bypass output short to battery	
		06	EGR cooler bypass output open load/short to GND	
P0400	EGR DC motor	62	EGR DC motor lock	
P1610	Immobilizer	00	Immobilizer 3 Control Unit (ICM3) function in ECU is not programmed or is in function reset mode	
		4F	ICM3 function in ECU is switched off	
P1611		00	Incorrect Security Code input	
P1613		00	Response frame not received	
P1614		00	Transmitted response was incorrect	
P1615		50	Transmitted response was distorted ("0")	
P1616		00	Failed power train identification	
P062F	DPF system	31	Electrically Erasable and Programmable Read Only Memory (EEPROM) failure	
P0409	EGR valve	52	EGR lift sensor characteristic abnormality	
U2103	CAN data error	00	Node error (Bus-off)	
U2108		70	ABS General Frame receive is failed	
U2107		70	Body Control Module (BCM) General Frame receive is failed	
U0418	Vehicle Integrated Function (VIF) related diagnosis	71	Brake pedal initial travel achieved validity invalid	
U2108		72	Traction Control System (TRC) request torque Rolling Counter (RC) error	
		74	TRC request torque Protection value error	
U0418		72	Brake pedal position RC error	
		74	Brake pedal initial travel achieved protection value error	
P0650		70	Instrument panel virtual device unavailability	
U0405		71	Cruise control switch invalid	
		72	Cruise control switch RC error	
		74	Cruise control switch protection value error	

DTC	Failure Part	Symptom	Failure Mode
P0602	Programming	44	Security access not armed
		47	Vehicle Identification Number (VIN) not programmed
		45	Variant word not programmed
		4A	Tire circumference not programmed
		46	Subnet Configuration List (SCL) is not defined
		4C	Engine identifier not programmed
		43	Rejected reprogramming attempt of a critical engine identifier
		4D	Maximum Vehicle Speed (Vmax) limitation speed not programmed
P1600		00	Engine ECU internal engine torque supervisions
P0621	Alternator L-terminal system	04	Alternator L-terminal duty ratio too high (at Key-ON test)
		08	Alternator L-terminal duty ratio too low (at Run-test)
P0622	Alternator F-terminal system	07	Alternator F-terminal ratio too high (at Key-ON test)
		03	Alternator F-terminal ratio too low (at Run-test)
P0571	Brake switch signal error	01	Permanently active (One or Both Brake error)
		56	Brake switch sequence error {Brake Lamp Switch (BLS) error}
P1602	Microinjection quantity learning (SQL)	4B	SQL value not programmed
P062F		34	SQL value error
P0299	Popping-off	5A	Variable Nozzle Turbo (VNT) hose popping off
P1602	Pump learning	4E	Pump learning incompleteness
P0500	ABS	71	All wheel signals set to invalid by sender ABS
P0501		71	Both non-driven wheel signals set to invalid by sender ABS
P1602	Programming	3B	Engine identifier in engine ECU calibration and engine ECU-EEPROM are not matching
P1602	Tuning protection	48	Illegal engine tuning protection

## (2) For Meriva

DTC	Failure Part	Symptom	Failure Mode
P0100	Mass airflow sensor	07	Mass airflow sensor signal too high
		06	Mass airflow sensor signal too low
		02	Mass airflow sensor performance invalid
P0095	Intake air temperature sensor	07	Intake air temperature sensor signal too high
		03	Intake air temperature sensor signal too low
P0115	Coolant temperature sensor	07	Coolant temperature sensor signal too high
		03	Coolant temperature sensor signal too low
		02	Coolant temperature sensor performance invalid

DTC	Failure Part	Symptom	Failure Mode
P1120	Accelerator position sensor 1	07	Accelerator position sensor No.1 signal too high
		03	Accelerator position sensor No.1 signal too low
P1122	Accelerator position sensor 2	07	Accelerator position sensor No.2 signal too high
		03	Accelerator position sensor No.2 signal too low
P1120	Accelerator position sensor	08	Accelerator position sensor signal performance Invalid
P0235	Boost pressure sensor	07	Boost pressure sensor signal too high
		03	Boost pressure sensor signal too low
		02	Boost pressure sensor performance invalid
P0180	Fuel temperature sensor	07	Fuel temperature sensor signal too high
		03	Fuel temperature sensor signal too low
P0190	Rail pressure sensor	07	Rail pressure sensor signal too high
		03	Rail pressure sensor signal too low
		02	Rail pressure sensor signal keeping the middle range
P0409	EGR lift (position) sensor	07	EGR lift (position) sensor signal too high
		03	EGR lift (position) sensor signal too low
P2226	Atmospheric pressure sensor	07	Atmospheric pressure sensor too high
		03	Atmospheric pressure sensor too low
P0110	Intake air temperature frequency sensor	07	Ambient temperature signal too high
		06	Ambient temperature signal too low
P0500	Vehicle speed sensor	01	Vehicle speed sensor frequency too high
		06	Vehicle speed sensor input open/short
		08	Vehicle speed sensor signal invalid
P0530	A/C pressure sensor	07	A/C pressure signal too high
		03	A/C pressure signal too low
		04	A/C pressure GND signal open
P1571	Brake system	01	Recognition of a permanently active brake contact (brake test switch)
		08	Evaluation of vehicle deceleration (brake test switch)
P0571	Brake switch	08	Brake switch diagnostics; Cruise control brake switch no signal {Brake Lamp Switch (BLS)}
P0512	Starter switch	01	Starter switch short to battery
		06	Starter switch open/short to GND
P0704	Clutch switch	08	Clutch switch circuit malfunction (manual transmission only)
P0520	Oil pressure switch	04	Oil pressure switch stuck open
P0335	Crankshaft position sensor	04	Crankshaft position sensor no pulse
		08	Crankshaft position sensor signal invalid
P0340	Cylinder recognition sensor	04	Cylinder recognition sensor no pulse
		08	Cylinder recognition sensor signal invalid

DTC	Failure Part	Symptom	Failure Mode
P0016	Crankshaft position sensor / Cylinder recognition sensor	08	Crankshaft position sensor/Cylinder recognition sensor signal synchronization error
P0685	Main relay	02	Main relay diagnostics; Main relay stuck closed
P1625		04	Main relay diagnostics; Main relay stuck open/relay output open load
P0641	Sensor reference voltage 1	07	Sensor reference voltage output No.1 too high
		03	Sensor reference voltage output No.1 too low
P0651	Sensor reference voltage 2	07	Sensor reference voltage output No.2 too high
		03	Sensor reference voltage output No.2 too low
P0380	Glow system	01	Glow controller command line short to battery; Glow controller internal malfunction
		06	Glow controller command line open load/short to GND; Glow controller internal malfunction
P0683		02	Glow plug R side short; Glow diagnosis line short to GND; Glow controller internal malfunction
		04	Glow plug R side open load; Glow diagnosis line open load; Glow controller internal malfunction
P0685	Main relay	01	Main relay/relay output short to battery
P1625		03	Main relay/relay output short to GND
P0645	A/C relay output	01	A/C relay output short to battery
		06	A/C relay output open load/short to GND
P0403	EGR control DC motor	08	EGR control DC motor Output 1 Short to battery/short to GND output 2 short to battery/short to GND motor short
		04	EGR control DC motor output 1 open load, output 2 open load; motor open load
P0201	Injector drive	01	TWV1 output open load; Injector #1 coil open
P0203		01	TWV2 output open load; injector #3 coil open
P0204		01	TWV3 output open load; injector #4 coil open
P0202		01	TWV4 output open load; injector #2 coil open
P2146		01	COM1 output short to battery; TWV1 or 3 output short to battery, both TWV1 and TWV3 open load
		02	COM1 output short to GND; TWV1 or 3 output short to GND
P2149		01	COM2 output short to battery; TWV2 or 4 output short to battery, both TWV2 and TWV4 open load
		02	COM2 output short to GND; TWV2 or 4 output short to GND
P0606		09	Capacitor charge-up circuit malfunction (insufficient charge)
		02	Capacitor charge-up circuit malfunction (excessive charge)

DTC	Failure Part	Symptom	Failure Mode
P0602	QR code failure	01	QR code not programmed
P062F		03	QR code error
		06	QR correction information is abnormal
P0093	Common rail system	06	Pressure limiter activated
P0088		02	Supply pump protection
P0087		08	Supply pump exchange
		06	Supply pump malfunction (insufficient flow)
P0001	Suction control valve (SCV)	01	SCV(+) output short to battery; SCV(-) output short to battery
		04	SCV(+) output Open Load/short to GND; SCV(-) output Open Load/short to GND; SCV coil open; SCV coil short
	SCV	02	SCV stuck
P0094	Common rail system	06	Rail pressure sensor performance invalid, Fuel leak
P0088		0B	Rail pressure exceeds upper limit
P0217	Engine overheat	0B	Engine overheat
P0219	Engine overrun	0B	Engine overrun
P0601	Engine ECU internal failure	0A	Check sum error - flash area
P0606		07	CPU fault; -Main CPU fault
		08	CPU fault; -Watchdog IC fault
P0301	Injector 1	04	Cylinder 1 fuel system failure
P0302	Injector 2	04	Cylinder 2 fuel system failure
P0303	Injector 3	04	Cylinder 3 fuel system failure
P0304	Injector 4	04	Cylinder 4 fuel system failure
P0400	EGR system	0B	EGR excessive flow (EGR positive deviation)
		03	EGR insufficient flow (EGR negative deviation)
	EGR valve	01	EGR valve open/close stuck
P0299	Turbo system	02	Turbo control system (negative deviation)
P0234		02	Turbo control system (positive deviation)
P0243	Electric Vacuum Regulating Valve (EVRV); Turbo	01	EVRV; Turbo output short to battery
		06	EVRV; Turbo output open load/short to GND
P0660	Variable swirl control (VSS) output (VSV)	01	VSS output (VSV) short to battery
		06	VSS output (VSV) open load/short to GND
P0638	Diesel throttle system	01	Diesel throttle controller output signal short to battery
		06	Diesel throttle controller output signal open load/short to GND
		08	Diesel throttle controller failure status
P2620			

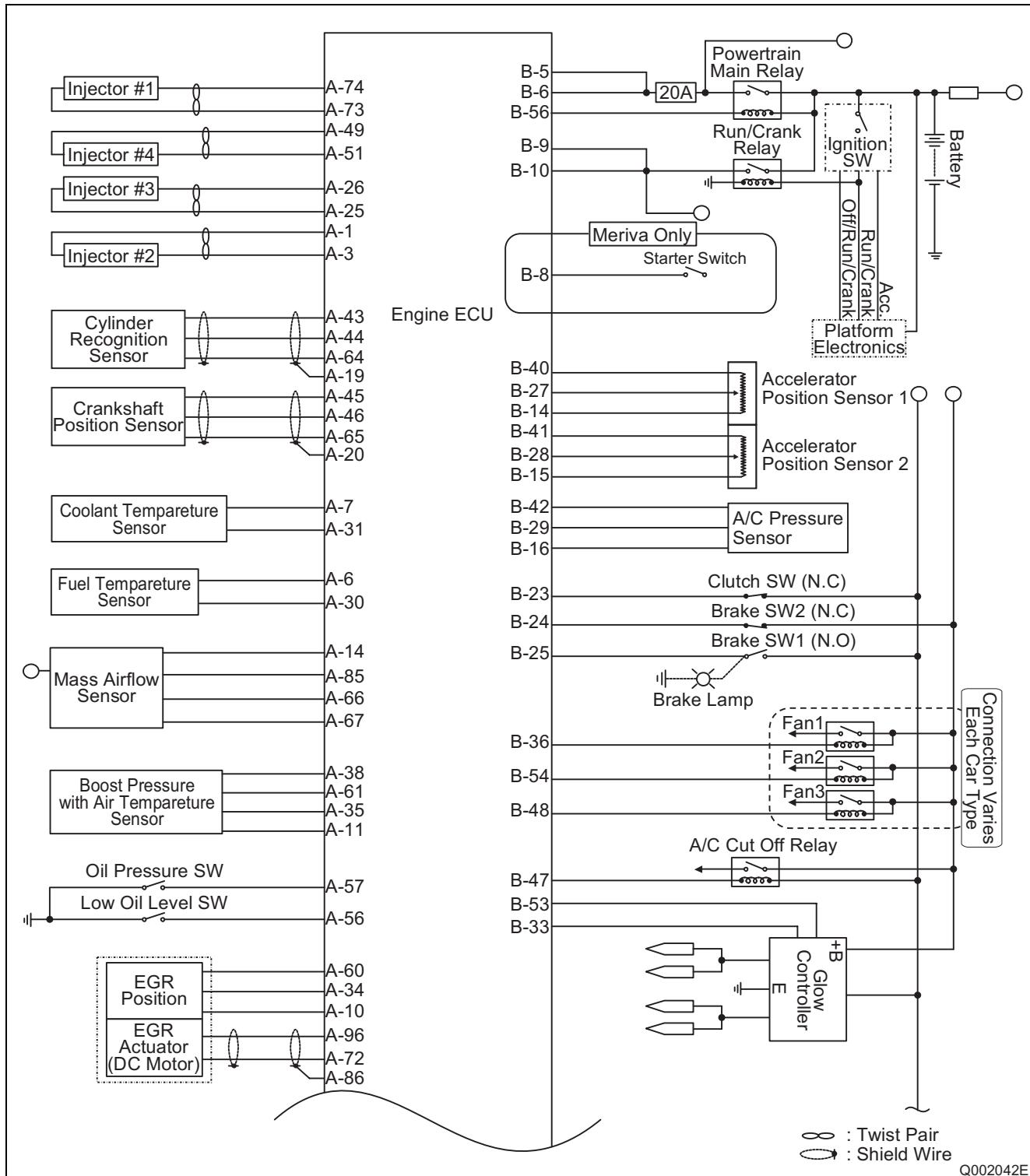
DTC	Failure Part	Symptom	Failure Mode
P0425	Upper oxygen catalyst temperature sensor (exhaust gas temperature 1)	07	Upper oxygen catalyst temperature sensor (exhaust gas temperature 1) voltage too high
		03	Upper oxygen catalyst temperature sensor (exhaust gas temperature 1) voltage too low
		04	Upper oxygen catalyst temperature sensor (exhaust gas temperature 1) temperature too high
P042A	Upper DPF temperature sensor (exhaust gas temperature 2)	07	Upper DPF temperature sensor (exhaust gas temperature 2) voltage too high
		03	Upper DPF temperature sensor (exhaust gas temperature 2) voltage too low
		04	Upper DPF temperature sensor (exhaust gas temperature 2) temperature too high
P2452	Differential pressure sensor	07	Differential pressure sensor voltage too high
		03	Differential pressure sensor voltage too low
		0B	Differential pressure too high
		08	Hose line disconnect upstream
P0480	Fan relay 1 output	01	Fan control relay 1 short to battery
		06	Fan control relay 1 open load/short to GND
P0481	Fan relay 2 output	01	Fan control relay 2 short to battery
		06	Fan control relay 2 open load/short to GND
P0482	Fan relay 3 output	01	Fan control relay 3 short to battery
		06	Fan control relay 3 open load/short to GND
U2100	CAN communication	0F	Node error
U2108		00	Lost communication with ABS/Traction Control System (TRC)
U2107		00	Lost communication with Body Control Module (BCM)
U2104		01	CAN-bus reset counter overrun
P1811	Torque control safety	08	Rolling counter failure
		09	Protection value failure
		00	Torque range resolution (IVLAN only)
U0405	Cruise switch	08	Cruise control off switch diagnostics; IVLAN cruise switch status malfunction
P1610	Immobilizer system	00	Secret key/security code are not programmed yet
		04	The Immobilizer 2 Control Unit (ICM2) function in engine ECU is switched off
		00	Wrong security code received
		00	Immobilizer identification abnormality
		00	Immobilizer code incorrectly transferred
		00	The transmitted transponder response was wrong
		04	The transmitted response was falsified by ICM2

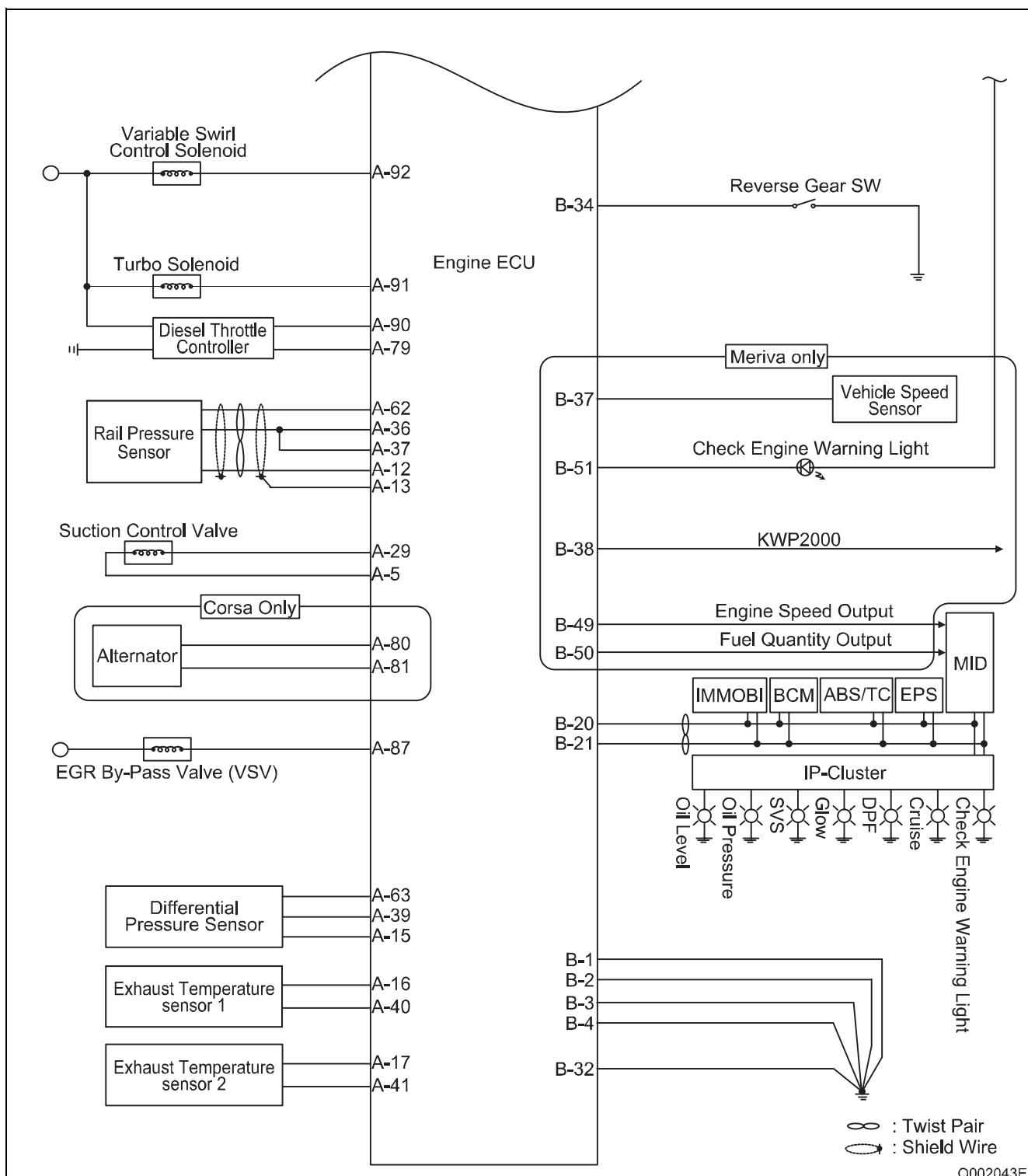
DTC	Failure Part	Symptom	Failure Mode
P0602	Programming	00	System not programmed/seed & key not armed
		04	Vehicle Identification Number (VIN) not programmed
		08	Variant not programmed
U2101	CAN communication	08	Maximum list of control modules or vehicle configuration list is not programmed
P0100	Mass airflow sensor	08	Mass airflow sensor too low
P242F	DPF system	06	DPF over loaded
		0B	DPF over loaded 2
P2002		07	Regeneration not completed
P2452		02	Differential pressure sensor characteristic abnormality
P0425	Upper oxygen catalyst temperature sensor (exhaust gas temperature 1)	02	Upper oxygen catalyst temperature sensor (Exhaust gas temperature 1) sensor characteristic abnormality
P042A	Upper DPF temperature sensor (exhaust gas temperature 2)	02	Upper DPF temperature sensor (exhaust gas temperature 2) sensor characteristic abnormality
P2425	EGR cooler bypass	01	EGR cooler bypass output short to battery
		06	EGR cooler bypass output open load/short to GND
P0400	EGR DC motor	02	EGR DC motor lock
P1615	Vehicle ID	00	Incorrect Vehicle ID Body Control Module (BCM) received
P1616		00	Incorrect Vehicle ID Immobilizer Control Unit (ICM) received
P0409	EGR valve	02	EGR lift sensor characteristic abnormality
P0168	Fuel injection quantity reduction	0B	Fuel injection quantity reduction diagnosis by exhaust temperature
P0650	Check engine warning light	01	Check engine warning light short to battery
		04	Check engine warning light open load/short to GND
P0720	NE output	08	Engine speed output to battery
		04	Engine speed output short to GND
P0500	ABS	00	All wheel signals invalid by sender ABS
P062F	DPF system	01	Electrically Erasable and Programmable Read Only Memory (EEPROM) failure
P0571	Brake switch signal error	01	Permanently active {Brake Lamp Switch (BLS) error}
		06	Brake switch sequence error (BLS error)
P1571		04	Brake switch event error {Brake Test Switch (BTS) error}
P1602	Microinjection quantity learning (SQL)	0B	SQL value not programmed
P062F		04	SQL value error
P0299	Popping-off	0A	Variable Nozzle Turbo (VNT) hose popping off

DTC	Failure Part	Symptom	Failure Mode
P1602	Pump learning	0E	Pump learning incomplete
	Programming	0A	Engine identifier in engine ECU calibration and engine ECU-EEPROM are not matching
	Tuning protection	08	Illegal engine tuning protection
	Programming	0C	Engine identifier not programmed
		03	Rejected reprogramming attempt of a critical engine identifier
P0110	Intake air temperature analog sensor	01	Intake air temperature sensor analog signal too high
		02	Intake air temperature sensor analog signal too low
P1600	Programming	00	Engine ECU-internal engine torque supervisions

## 7. EXTERNAL WIRING DIAGRAM

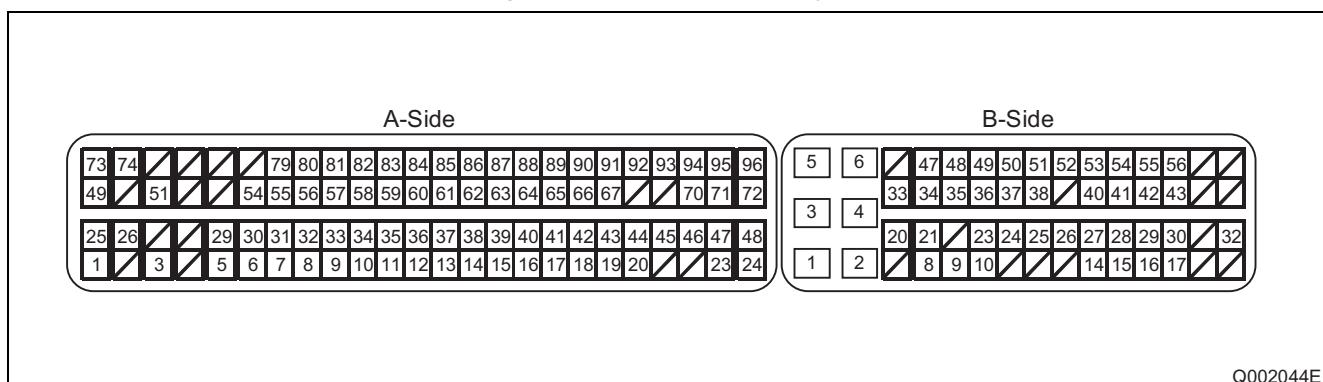
### 7.1 Engine ECU External Wiring Diagram





## 7.2 Engine ECU Connector Diagram

Engine ECU Connector Pin Layout



Terminal Connections (A-side, pins 1-48)

No.	Pin Symbol	Connections	No.	Pin Symbol	Connections
1	COMMON2	Injector common 2	25	COMMON2	Injector common 2
2	—		26	TWV2	Injector #3
3	TWV4	Injector #2	27	—	
4	—		28	—	
5	SCV-	Suction control valve (SCV) (-)	29	SCV+	Suction control valve (SCV) (+)
6	THF-GND	Fuel temperature sensor (GND)	30	THF	Fuel temperature sensor (Signal)
7	THW-GND	Coolant temperature sensor (GND)	31	THW	Coolant temperature sensor (Signal)
8	LVNT-GND	Variable nozzle turbo position sensor (GND)	32	LVNT	Variable nozzle turbo position sensor (Signal)
9	LVSS-GND	Variable swirl control position sensor (GND)	33	LVSS	Variable swirl control position sensor (Signal)
10	LEGR-GND	EGR position sensor (GND)	34	LEGR	EGR position sensor (Signal)
11	PIM-GND	Boost pressure sensor (GND)	35	PIM	Boost pressure sensor (Signal)
12	PFUEL-GND	Rail pressure sensor (GND)	36	PFUEL	Rail pressure sensor (Signal)
13	PFUEL-SLD	Rail pressure sensor (Shield)	37	PFUEL	Rail pressure sensor (Signal)
14	MAF-GND	Mass airflow sensor (GND)	38	IAT	Intake air temperature sensor 2 (Signal)
15	PExhD-GND	Differential pressure sensor (GND)	39	PExhD	Differential pressure sensor (Signal)
16	THEExh1-GND	Exhaust temperature sensor 1 (GND)	40	THEExh1	Exhaust temperature sensor 1 (Signal)
17	THEExh2-GND	Exhaust temperature sensor 2 (GND)	41	THEExh2	Exhaust temperature sensor 2 (Signal)
18	THEExh3-GND	Exhaust temperature sensor 3 (GND)	42	THEExh3	Exhaust temperature sensor 3 (Signal)
19	G-SLD	Cylinder recognition sensor (Shield)	43	G+	Cylinder recognition sensor (+)
20	NE-SLD	Crankshaft position sensor (Shield)	44	G-	Cylinder recognition sensor (-)
21	VNT-	Variable nozzle turbo DC motor (-)	45	NE+	Crankshaft position sensor (+)
22	VNT+	Variable nozzle turbo DC motor (+)	46	NE-	Crankshaft position sensor (-)
23	—		47	—	
24	—		48	—	

**Terminal Connections (A-side, pins 49-96)**

No.	Pin Symbol	Connections	No.	Pin Symbol	Connections
49	COMMON1	Injector common 1	73	COMMON1	Injector common 1
50	—		74	TWV1	Injector #1
51	TWV3	Injector #4	75	—	
52	—		76	—	
53	—		77	—	
54	SPAD-VCC	Spare	78	—	
55	VNT-DI	Variable nozzle turbo actuator diagnosis	79	I/T-DI	Diesel throttle controller diagnosis
56	LOIL-SW	OIL level SW signal	80	ACG-F	ACG F-terminal (Alternator)*1
57	POIL-SW	OIL pressure SW signal	81	ACG-L	ACG L-terminal (Alternator)*1
58	LVNT-VCC2	Variable nozzle turbo position sensor (VCC)	82	S-SW1	Spare
59	LVSS-VCC2	Variable swirl control position sensor (VCC)	83	S-SW2	Spare
60	LEGR-VCC2	EGR position sensor (VCC)	84	S-SW3	Spare
61	PIM-VCC2	Boost pressure sensor (VCC)	85	IAT-ANG	Mass airflow sensor air temperature Analog
62	PFUEL-VCC2	Rail pressure sensor (VCC)	86	EGR-GND	EGR shield
63	PExhD-VCC2	Differential pressure sensor (VCC)	87	BY-PASS	EGR By-pass Valve
64	G-VCC2	Cylinder recognition sensor (VCC)	88	S-REL2	Spare
65	E-VCC1	Crankshaft position sensor (VCC)	89	S-LMP1	Spare
66	IAT-FRQ	Mass airflow sensor air temperature frequency	90	INT-CS	Diesel throttle controller (Signal)
67	MAF-FRQ	Mass airflow sensor frequency	91	VNT	Turbo solenoid
68	CAN-H	CAN High	92	VSS	Variable swirl control solenoid
69	CAN-L	CAN Low	93	—	
70	—		94	—	
71	SP-FRQ	Spare	95	SP-FRQ1	Spare
72	EGR-	EGR DC motor (-)	96	EGR+	EGR DC motor (+)

&lt; NOTE &gt;

\*1 : Meriva only

**Terminal Connections (B-side, pin 58)**

No.	Pin Symbol	Connections	No.	Pin Symbol	Connections
1	GND	Signal, sensor GND	30	LFUEL	Fuel level signal
2	GND	Signal, sensor GND	31	—	
3	P-GND	Power GND	32	CASE-GND	Case GND
4	P-GND	Power GND	33	GL-DI	Glow controller diagnosis
5	+B	Power +B	34	RG-SW	Reverse gear switch
6	+B	Power +B	35	LW-SW	Water level switch
7	—		36	FAN1	Fan 1

No.	Pin Symbol	Connections	No.	Pin Symbol	Connections
8	STT-SW	Starter switch*1	37	SPD	Vehicle speed sensor*1
9	IG-SW	Ignition 1	38	KWP2000	ISO 14230*1
10	IG-SW	Ignition 0	39	—	
11	—		40	ACCP1-VCC1	Accelerator position sensor 1 (VCC)
12	—		41	ACCP2-VCC2	Accelerator position sensor 2 (VCC)
13	—		42	PAC-VCC2	A/C pressure sensor (VCC)
14	ACCP1-GND	Accelerator position sensor 1 (GND)	43	STT-REL-H	Starter relay HSD
15	ACCP2-GND	Accelerator position sensor 2 (GND)	44	—	
16	PAC-GND	A/C pressure sensor (GND)	45	—	
17	LFUEL-GND	Fuel level return	46	—	
18	—		47	ACT-REL	A/C cutoff relay
19	—		48	FAN3-REL	Fan 3 relay
20	GMLAN-H	GMLAN High	49	NEOUT	Engine speed output*1
21	GMLAN-L	GMLAN Low	50	FUELOUT	Fuel quantity output*1
22	—		51	MIL	Check engine warning light*1
23	CL-SW	Clutch switch	52	FH-REL	Fuel heater relay
24	BK2-SW	Brake 2 switch	53	GL-CS	Glow controller signal
25	BK1-SW	Brake 1 switch	54	FAN2-REL	Fan 2 relay
26	EH-SW	Electrical heater switch	55	STT-REL-L	Starter relay LSD
27	ACCP1	Accelerator position sensor 1 (Signal)	56	M-REL	Powertrain main relay
28	ACCP2	Accelerator position sensor 2 (Signal)	57	—	
29	PAC	A/C pressure sensor (Signal)	58	—	

&lt; NOTE &gt;

\*1 : Meriva only

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